



# Minimizing Production Downtime for a PDMLink 8.0 to 9.1 Migration

Charles A. (Chip) Shearrow  
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# Agenda



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# Introduction



Charles A. (Chip) Shearrow

- > 1991-June 2000 Ohio Northern University (Advanced Robotics and Automation)
- > 1998- Summer Proposal for the Design Data Management System
- > 1999- Summer NASA-JSC Directors Grant for Virtual Simulation
- > June 2000- 2011 Indyne, Inc. at NASA-JSC (Pro/E User, Intralink Administrator, Workflows, Training, Operations Lead, Supervisor, Senior Systems Engineer)
- > January 19, 2011- Present MEI Technologies at NASA-JSC (Operations, Supervisor, Senior Systems Engineer)
- > E-mail- [Charles.a.shearow@nasa.gov](mailto:Charles.a.shearow@nasa.gov)
- > MEI Technologies - <http://www.meitechinc.com>

# Migration Requirements



## > Minimize Risk to Data

- Active data not stored in other systems
- Data constantly changing

## > Minimize length of outage

- Due to the number of users and active projects supported with the system

## > Maintain access to data

- Even during the outage access to data must be maintained

## > Correct data anomalies

- "Stuff" in "stuff" out
- System has been migrated 4 times

## > Upgrade system software

- LDAP, Apache, Tomcat, Rware and Windchill on active production servers

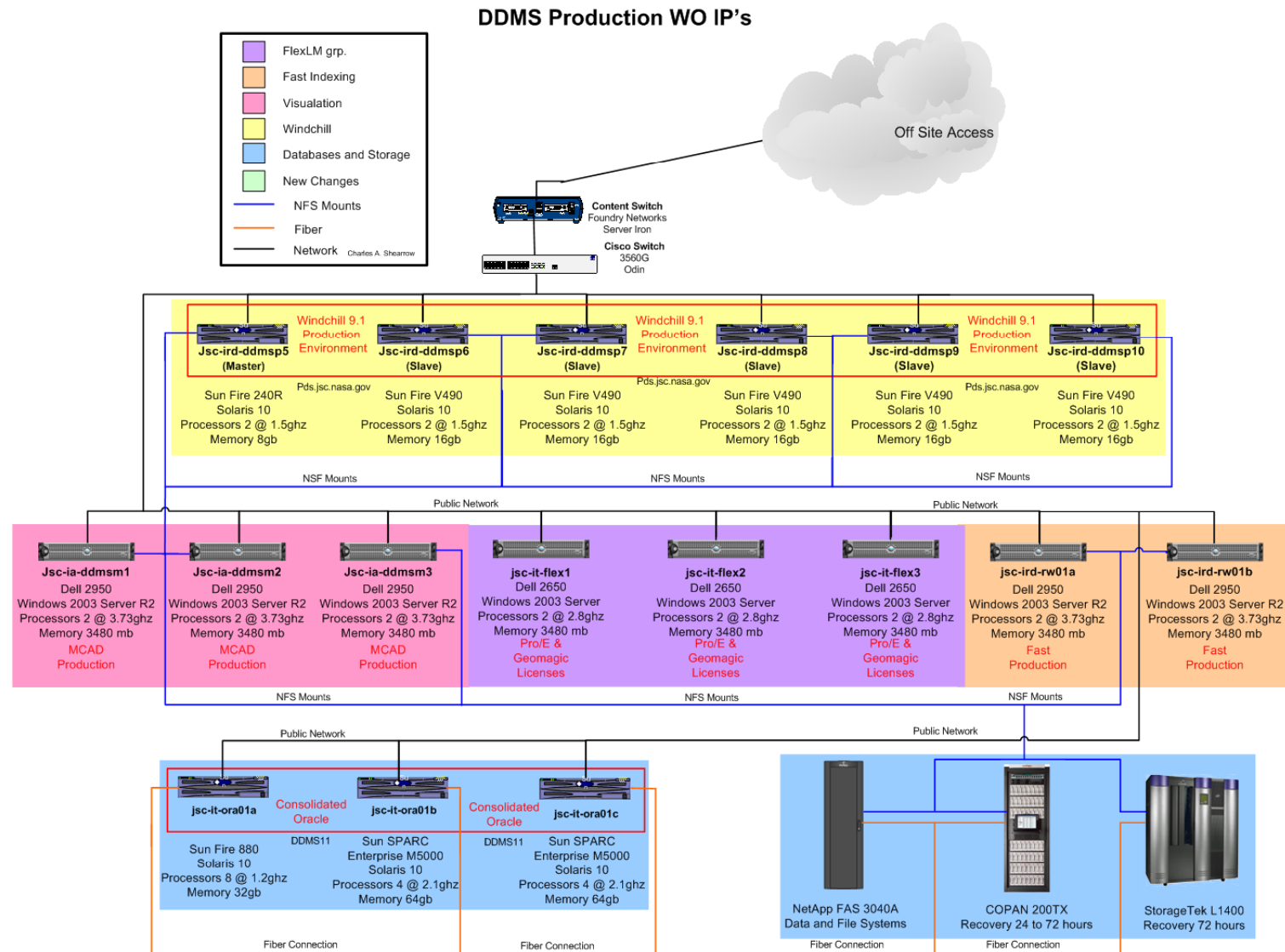
## > Transfer Customizations

- Maintain functionality between versions

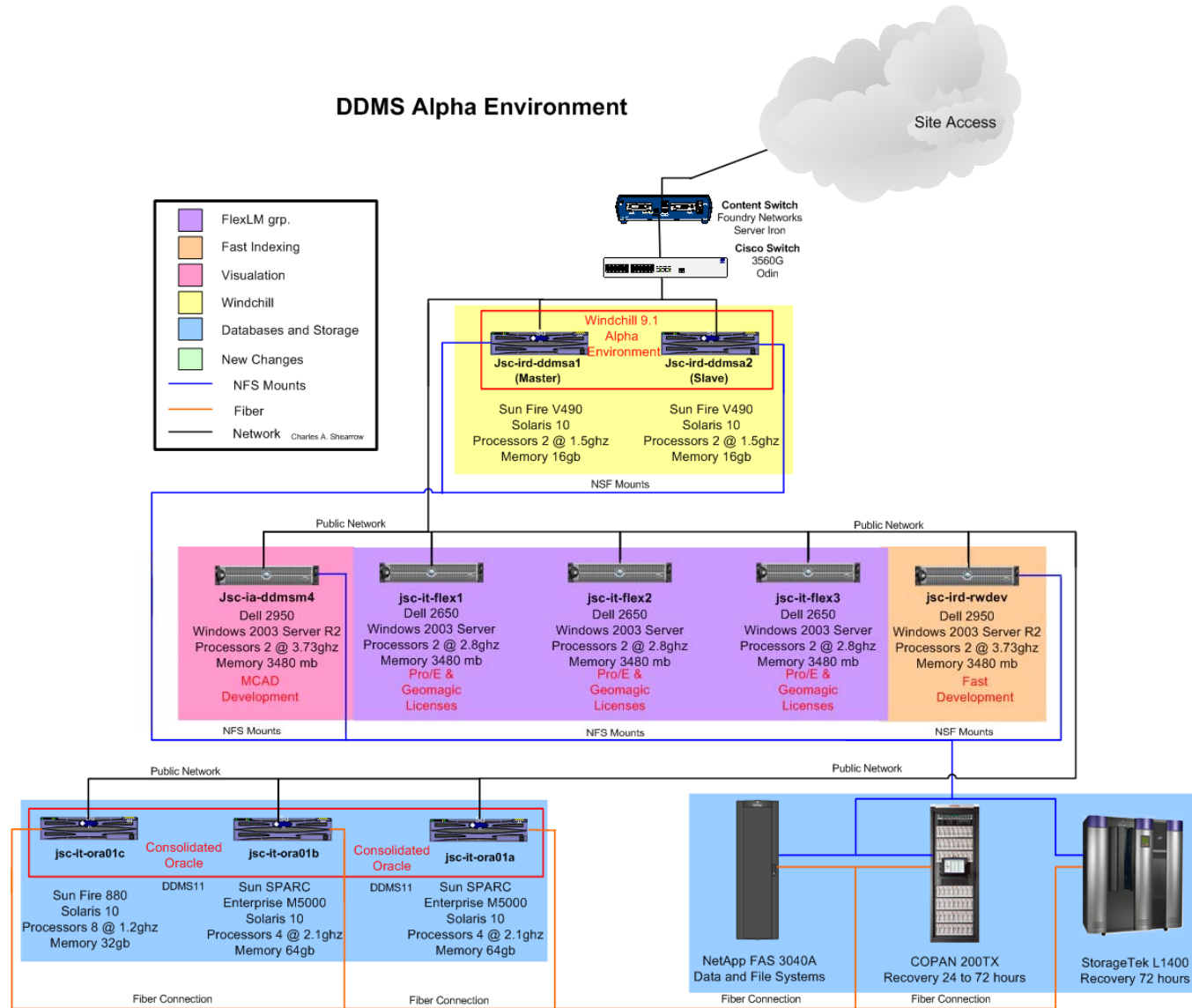
## > Deploy automated testing

- Automated testing completed before rollout

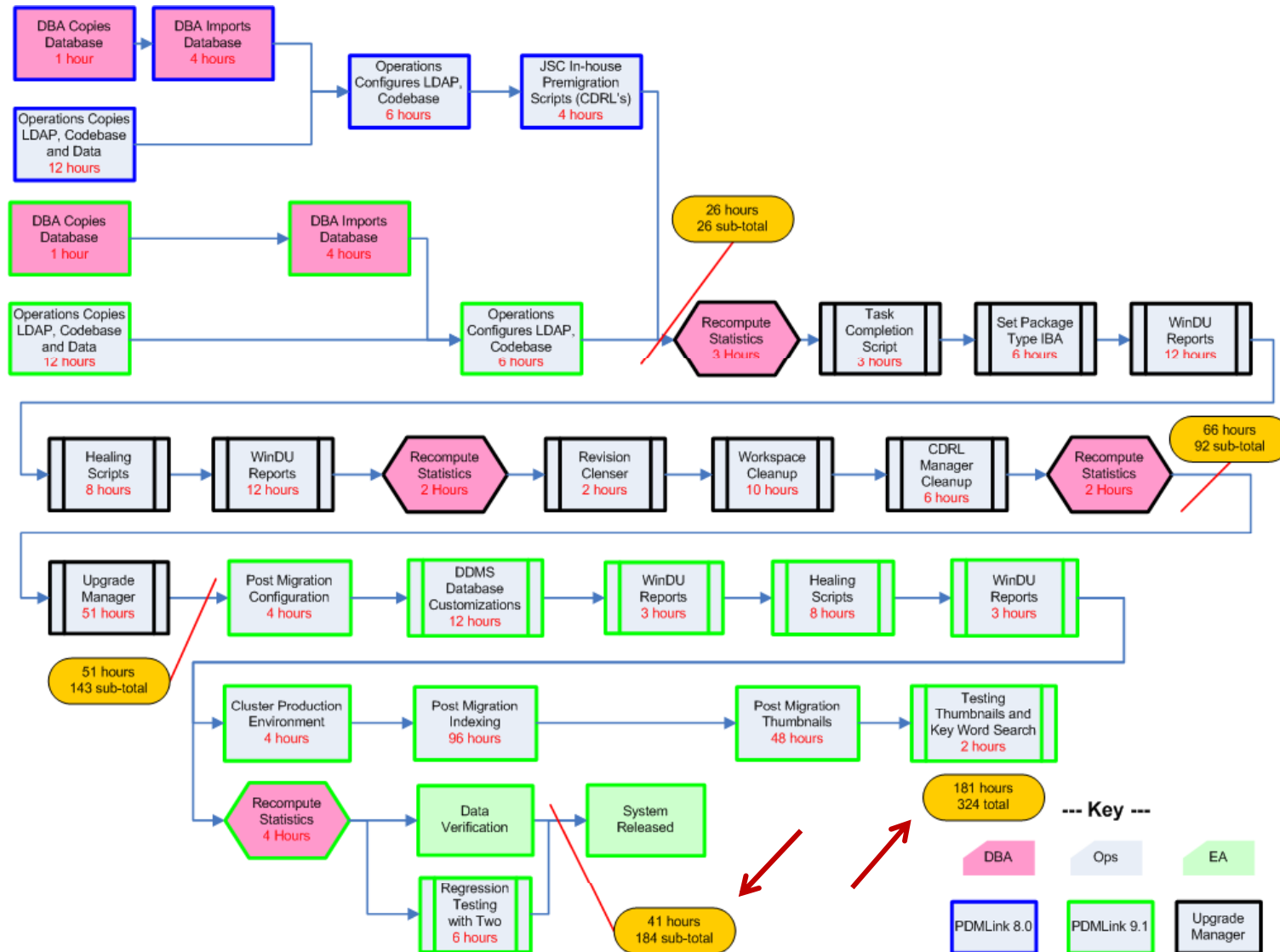
# Migration Environment



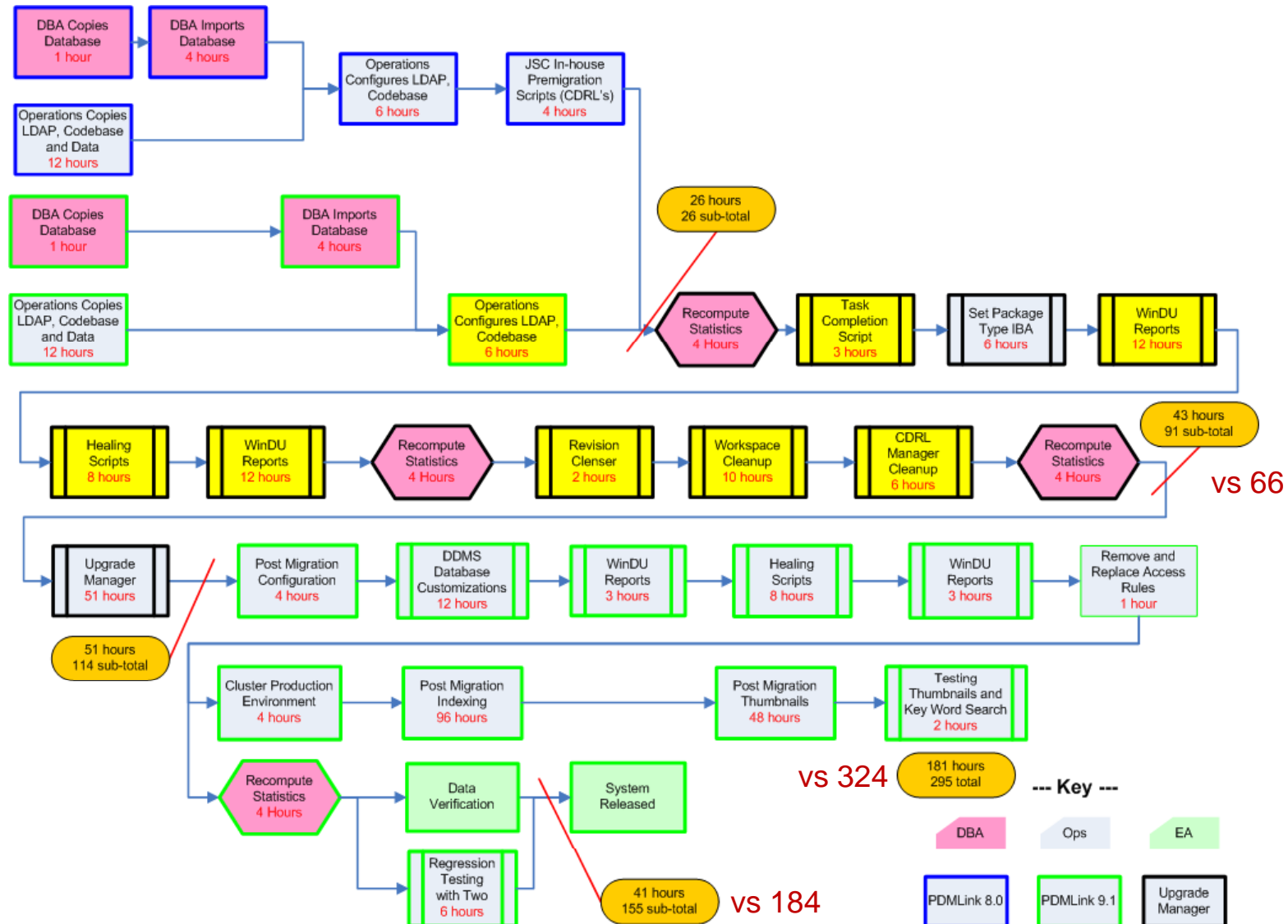
# Migration Environment



# Initial Estimated Timeline



# Pre-Migration Time Savers





# Pre-Migration Time Savers



## > Custom Task Completion Script:

- Would reduce the time at migration and post migration to restart workflows. Can be eliminated from future migration runs. **Low risk due to past success.**

## > WinDU Reports:

- Currently runs 32 hours but can be reduced significantly at migration time by fixing issues now. **Low risk due to past success.**

## > Revision Cleanser:

- Task takes two hours to run and can be eliminated from future migration runs. **Low risk due to past success.**

## > Workspace Cleanup:

- Encourage cleanup on production at two weeks and one week out from the migration. Runs about ten hours now and could be reduced to 4 or 5 hours. **Low risk due to past success and customer participation.**

# Pre-Migration Time Savers



## > CDRL Manager Cleanup:

- Currently runs in about 6 hours and by pre running this on production it will reduce the time to about 1 hour. **BUT** only the latest iteration of each version will be kept. **Low risk due to past success but customer outreach required.**

## > Fixing EPD:

- Repairs attachments so they can be seen in the 9.1 environment. Will cause the 6.2 legacy links on the workflow and lifecycle pages to disappear in the 8.0 system undoing a customization. **Low risk because the data is not lost and the customer still has access to the information**

## > Run our WTPProduct to WTPart Script:

- Used to resolve migration conflicts. If it does not work then we perform the PTC solution of deletion of the access rules **at migration**. **Low risk due to the object not being used in the 8.0 system.**

## > 8.0 migration Patches:

- Install them on production before the migration process. **Low risk due to pre application to Staging and Alpha environments.**

# Pre-Migration Time Savers



## > 8.0 migration Patches:

- Install them on production before the migration process. Low risk due to pre application to Staging and Alpha environments.

## > Establish the 9.1 Environment:

- Pre migration install and configuration of the new 9.1 environment will save 8 hours time for the migration. Moderate risk due to working on an active production system. This task would be configured one node at a time. The configuration and testing would have to occur at low usage times because 8.0 would have to be stopped.

## > Rware Upgrade:

- Currently the 9.1 systems are working with the old Rware it is recommending this upgrade come after a successful migration. Low risk due to current 9.1 environments are using the current version of Rware successfully.

## > WCDS:

- Is the Windchill replacement for the current LDAP. It is recommending this task be held until after the migration has been completed. Low risk because the current 9.1 environments are using Aphelion.

# Migration Time Savings



- > Task Completion Script 2.5 hours
- > WinDU Reports 4 hours
- > Healing Scripts 6 hours
- > WinDU Reports 4 hours
- > Revision Clenser 1.5 hours
- > Workspace Cleanup 5 to 8 hours
- > CDRL Manager Cleanup 5 hours
- > Fixing EPD (Aprox.1 hour)
- > Run our WTPProduct to WTPart Script (Aprox .5 hours)

# Migration Time Savings



- > Pre Configure and test 9.1 install 6 hours
- > 8.0 migration Patches 1 hour
- > Establish the 9.1 Environment 8 hours

## Review

- > Total potential time savings to the migration process is estimated to be 36.5 hours
- > 10 of the 11 tasks are low risk
- > Risk is controlled on the moderate risk task by configuration and testing being performed after hours.
- > Shortens the pre-migration timeline by almost 40 hours per run or overall 120 hours.

# Migration Activities



## Parallel Efforts

### > Customized code migration

- 8.0 customizations upgraded to work with 9.1

### > Data migration

- Parallel system (Alpha) established with current production data

### > Training development

- Materials developed in parallel as code is deployed to the 9.1 training environment

### > Environment deployment

- Production could not be stopped
- Different users for the Unix system
  - Root vs wchill
- Also deployed a common code base
  - Located on NetApp
- Vaulting changed for automated deployment of folders
  - Done in hours not weeks

# Post Migration Activities

## Statistical Evaluation of Data

### > Quantitative vs. Qualitative

- Establishing sample size scientifically is a quantitative sample selection
- Goal is to minimize the time spent in testing and still deliver a quality product
- Confidence level was set at .05 (accepted scientific standard)

### > Identification of objects

- Used the object types identified in the system
- Only sampled items to be migrated

### > Identification of strata

- Unique objects divided into stratus to more accurately pull the sample
- Each stratus was treated as a separate sampling exercise
- Total of the sampled objects must equal the master sample goal

### > Random selection

- Internet site
- Excel functionality

# Post Migration Activities



## > Thumbnail Generation

- 8.0 thumbnails not compatible with 9.1 system
- To be completed during low peak times

## > Keyword Indexing

- New index due to new software version
- Exclusion list used for selective publishing
  - Zip, pdf, avi by size
- Identify long processing items and publish them last

## > Data verification

- Performed during the indexing process
- Quantitatively guided for time savings
- Performed by system champions and migration team

## > Regression Testing

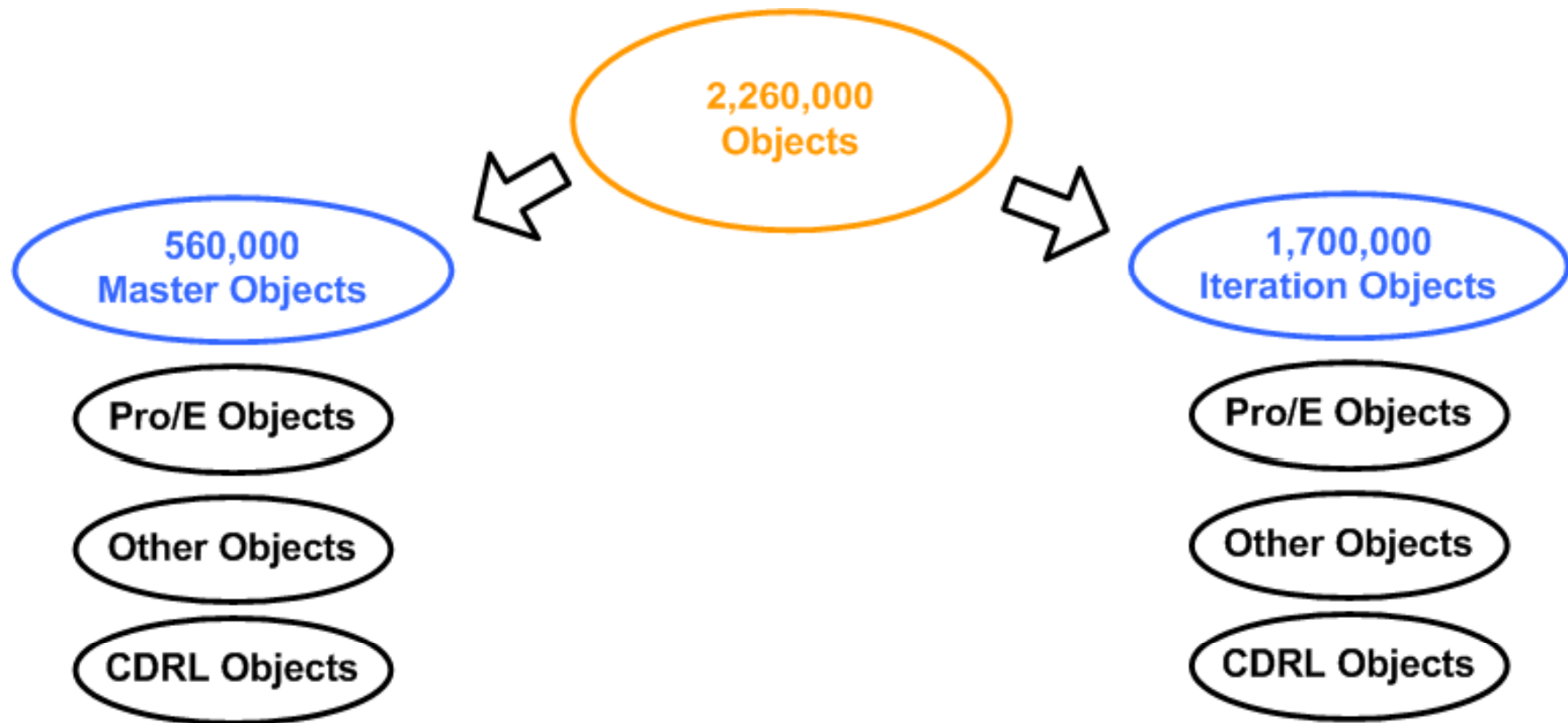
- Sanity check to insure the customizations had been deployed correctly
- Most testing done with automated testing software (Test Director)



## > Establish Data Validation Boundaries

- Stratified random sample technique
- Margin of error set at .03
  - Maximum errors during testing can be no larger than 685
- Confidence level set to .05
  - Standard scientific sampling confidence level
- Total number of objects 2,283,244
  - Objects in the system to be migrated
- Sample size 1,067
  - To be achieved by a random sample
  - About 4.7% of the objects

# Statistical Evaluation of Data



# Statistical Evaluation of Data

## PDMLink 9.1 Upgradation

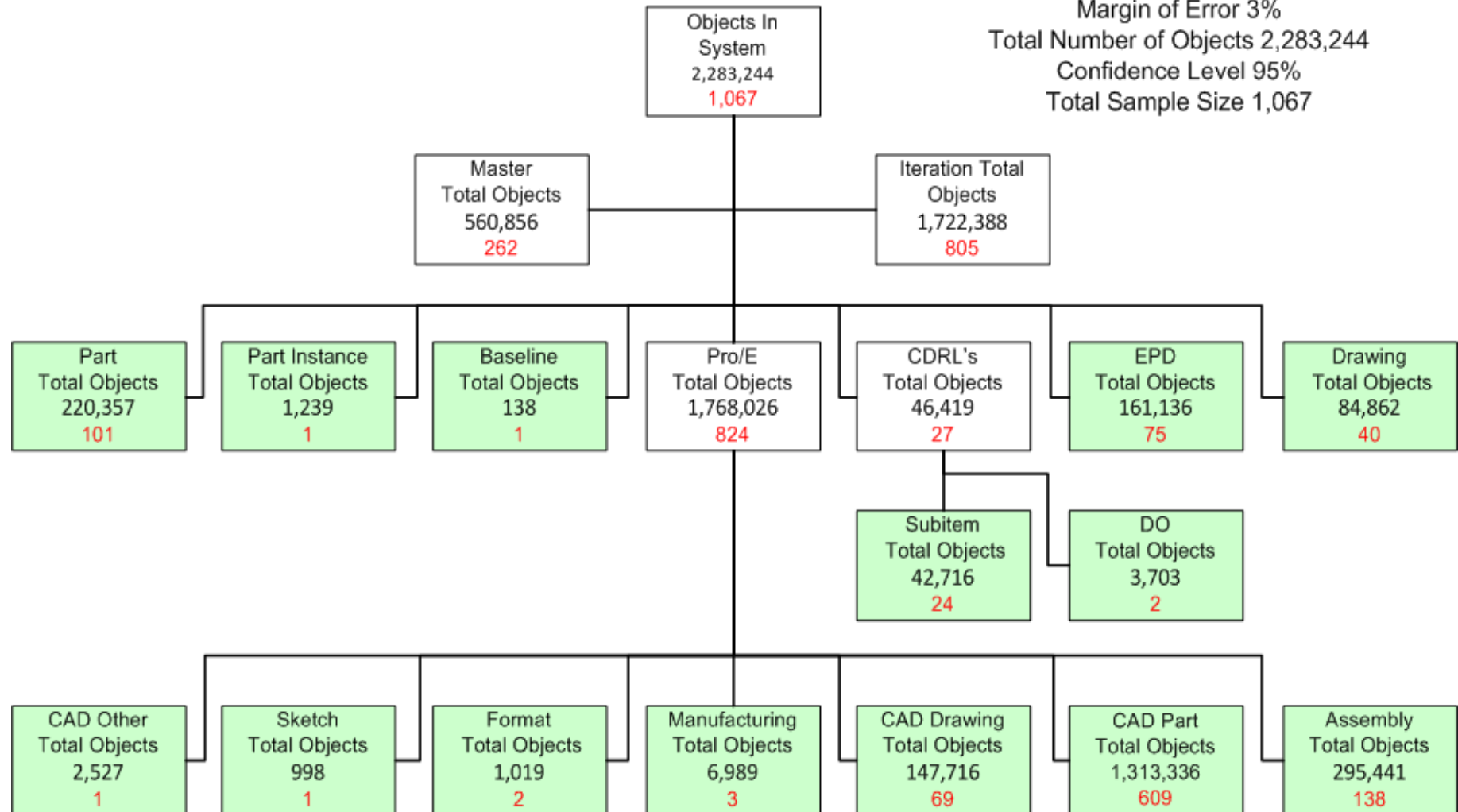
Stratified Random Sample

Margin of Error 3%

Total Number of Objects 2,283,244

Confidence Level 95%

Total Sample Size 1,067



# Risk Management Activities



## > Duplicate Systems

- Clone production to Alpha
- Providing as close to production as possible
- Only difference is the hardware

## > Duplicate Data

- Clone production to Alpha
- Cloned multiple times due to live system accumulating data between runs

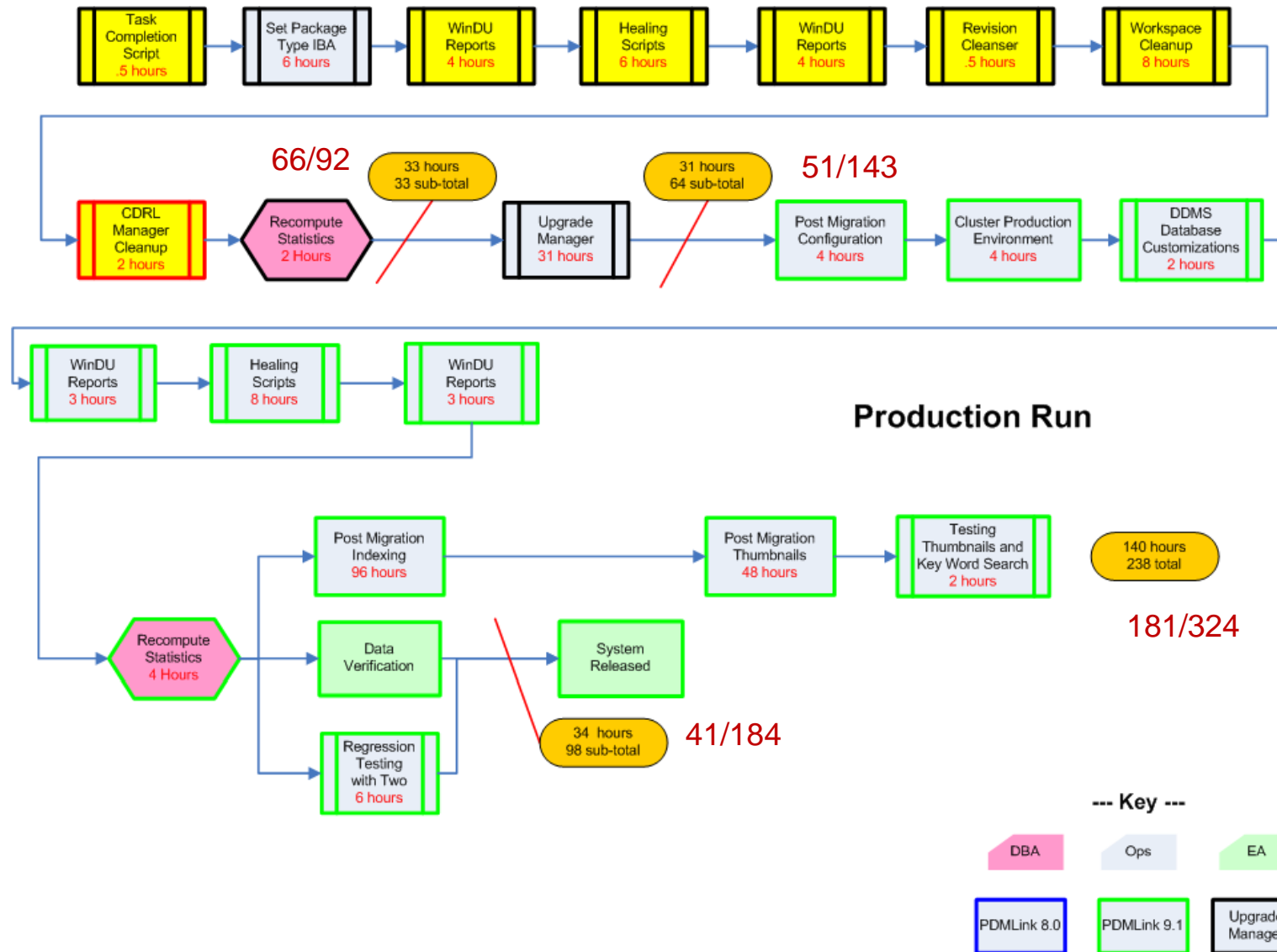
## > Statistical Analysis

- Minimize quantity of data to be evaluated
- Provide the most accurate validation of data in a timely manner

## > New Production System

- Built on the running production system
- Different Unix users
- Different codebases
- Same LDAP

# Production Migration



# Lessons Learned



## > Parallel efforts

- Code conversion and migration
- Migration runs and operations
- System building and operations
- Data evaluation and indexing
- Sanity check and indexing
- Thumbnails generation and operations

## > Quantitative Evaluation

- Data quantity
- Selection of strata
- Selection of champions
- Execution

## > WinDu

- Start before planning starts

## > Migrator

- Will require many runs before it is over
- Indexes may be needed to shorten the process

# Minimizing Production Downtime for a PDMLink 8.0 to 9.1 Migration



> Questions and Answers

**“Failure is not an option”**

**“Go Forth and Migrate”** Chip

*- Coined by a True American Hero*

***Gene Kranz***

***NASA Flight Control Director and  
Presidential Medal of Freedom  
Recipient***